



## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2022-0400; Project Identifier AD-2022-00179-E; Amendment 39-22009; AD 2022-08-06]**

**RIN 2120-AA64**

#### **Airworthiness Directives; General Electric Company Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule; request for comments.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for certain General Electric Company (GE) CF34-8C and CF34-8E model turbofan engines. This AD was prompted by an “Engine Degraded” message received in-flight from the Engine Indicating and Crew Alerting System (EICAS), and a subsequent investigation by the manufacturer that revealed corrosion of the variable geometry (VG) system actuator, which can cause the full authority digital engine control (FADEC) software to command and lock the engine at idle until it is restarted. This AD requires performing a rotational torque check on the actuating linkage assembly and, depending on the results of the rotational torque check, replacement of the compressor inlet guide vane (IGV) outer shroud bushing and vane spindle bushing with parts eligible for installation. This AD also requires reporting the results of the rotational torque check to GE. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The FAA must receive comments on this AD by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to <https://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: (202) 493-2251.
- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- Hand Delivery: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For service information identified in this final rule, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com); website: <https://www.ge.com>. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2022-0400.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2022-0400; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The street address for the Docket Operations is listed above.

**FOR FURTHER INFORMATION CONTACT:** Scott Stevenson, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7132; email: [Scott.M.Stevenson@faa.gov](mailto:Scott.M.Stevenson@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Background**

On August 11, 2021, a Bombardier CRJ1000 airplane, powered by GE CF34-8C5 model turbofan engines, experienced an in-flight engine shutdown that resulted in a

diversion. The manufacturer's investigation found that this airplane was parked outdoors for extended lengths of time within 10 miles (16 km) from a saltwater coastline, causing corrosion to develop on the CF34-8C5 engines' compressor VG actuator rod, seizure of the rod end bearing, and fracture of the rod end. Based on the manufacturer's investigation, on November 4, 2021, the FAA issued Emergency AD 2021-23-51 (followed by publication in the Federal Register on December 14, 2021, as a Final Rule, Request for Comments (86 FR 70969)), which requires performing an inspection of the master compressor VG actuator and slave compressor VG actuator on certain GE CF34-8C and CF34-8E model turbofan engines and, depending on the results of the inspection, replacement of the part with a part eligible for installation.

Since the FAA issued AD 2021-23-51, the manufacturer determined that two additional in-flight events occurred that were related to this unsafe condition. On September 7, 2021 and October 26, 2021, two Bombardier CRJ-900 airplanes powered by GE CF34-8C5 model turbofan engines received "Engine Degraded" messages from the EICAS during flight. A subsequent investigation by the manufacturer found that these engines were operated infrequently over the past 2 years, with one engine showing corrosion findings after being stored approximately 45 miles (72 km) from a saltwater coastline, and another engine showing corrosion findings after being installed on an airplane parked for over 250 days. The manufacturer's investigation concluded that engines stored outdoors for 250 or more days are at risk of the excessive corrosion build up, with the risk increasing if the engines were stored outdoors in close proximity to a saltwater coastline. These conditions caused corrosion to develop between the high-pressure compressor case and vane bushings, increasing the VG actuation loads and slowing the VG response. As a result, the VG command and actual positions exceeded acceptable disagreement parameters, triggering an EICAS "Engine Degraded" message. In response to the "Engine Degraded" message, all versions of the full authority digital engine control (FADEC) software on GE CF34-8E engines, and FADEC software earlier than Version 6.60 on GE CF34-8C engines automatically reduces the engine to idle and locks the throttle until the engine is shut down and restarted. This condition, if not addressed, could result in failure of one or more engines, loss of engine thrust control,

and reduced control of the airplane. The FAA is issuing this AD to address the unsafe condition on these products.

### **FAA's Determination**

The FAA is issuing this AD because the agency has determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

### **Related Service Information under 1 CFR Part 51**

The FAA reviewed GE CF34-8C Service Bulletin (SB) 72-0356 R00 and GE CF34-8E SB 72-0244 R00, both dated February 15, 2022. These SBs specify procedures for performing a one-time rotational torque check of the actuating linkage assembly, differentiated by engine model, to identify possible interface corrosion or seizure on the compressor case, compressor IGV outer shroud bushing, vane spindle bushing, compressor stator IGV variable vane, compressor stator stage 1 variable vane, compressor stator stage 2 variable vane, compressor stator stage 3 variable vane, and compressor stator stage 4 variable vane. These SBs also specify instructions for operators to report the rotational torque check results to GE. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

### **AD Requirements**

This AD requires performing a rotational torque check on the actuating linkage assembly and, depending on the results of the rotational torque check, replacement of the compressor IGV outer shroud bushing and vane spindle bushing with parts eligible for installation. This AD also requires reporting the results of the rotational torque check to GE.

### **Interim Action**

The FAA considers this AD to be an interim action. The inspection reports that are required by this AD will enable the manufacturer to obtain better insight into the nature, cause, and extent of the corrosion, and eventually to develop final action to address the unsafe condition. Once final action has been identified, the FAA might consider further rulemaking.

## **Justification for Immediate Adoption and Determination of the Effective Date**

Section 553(b)(3)(B) of the Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq.*) authorizes agencies to dispense with notice and comment procedures for rules when the agency, for “good cause,” finds that those procedures are “impracticable, unnecessary, or contrary to the public interest.” Under this section, an agency, upon finding good cause, may issue a final rule without providing notice and seeking comment prior to issuance. Further, section 553(d) of the APA authorizes agencies to make rules effective in less than thirty days, upon a finding of good cause.

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies foregoing notice and comment prior to adoption of this rule. The FAA considers corrosion of the VG system actuator to be an urgent safety issue. Performance of a rotational torque check of the actuating linkage assembly will detect excessive corrosion build up on the VG system actuator. This rotational torque check is necessary to prevent failure of one or more engines, loss of engine thrust control, and reduced control of the airplane. Engines installed on airplanes parked outdoors for 250 or more days are at risk of excessive corrosion build up. The risk of the excessive corrosion build up increases if the engines are stored outdoors in close proximity to a saltwater coastline. For affected engines installed on airplanes that were parked outdoors within 10 miles of a saltwater coastline, a rotational torque check on the actuating linkage assembly must be accomplished within 30 flight hours or 5 calendar days after the effective date of this AD. For affected engines installed on airplanes that were parked outdoors within 50 miles of a saltwater coastline, a rotational torque check of the actuating linkage assembly must be accomplished within 200 FHs or 35 calendar days after the effective date of this AD. Additionally, for all other affected engines installed on airplanes that were parked outdoors, the rotational torque check on the actuating linkage assembly must be accomplished before exceeding 880 FHs. According to fleet data, 880 FHs is approximately 100 calendar days. For affected engines with an actuating linkage assembly that does not pass the rotational torque check, this AD requires replacement of the compressor IGV outer shroud bushing and vane spindle

bushing before further flight. Accordingly, notice and opportunity for prior public comment are impracticable and contrary to the public interest pursuant to 5 U.S.C. 553(b)(3)(B).

In addition, the FAA finds that good cause exists pursuant to 5 U.S.C. 553(d) for making this amendment effective in less than 30 days, for the same reasons the FAA found good cause to forego notice and comment.

### **Comments Invited**

The FAA invites you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under ADDRESSES. Include “Docket No. FAA-2022-0400 and Project Identifier AD-2022-00179-E” at the beginning of your comments. The most helpful comments reference a specific portion of the final rule, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this final rule because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to <https://www.regulations.gov>, including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this final rule.

### **Confidential Business Information**

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this AD contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this AD, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this AD. Submissions containing CBI should be sent to Scott Stevenson, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA

01803. Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

### **Regulatory Flexibility Act**

The requirements of the Regulatory Flexibility Act (RFA) do not apply when an agency finds good cause pursuant to 5 U.S.C. 553 to adopt a rule without prior notice and comment. Because FAA has determined that it has good cause to adopt this rule without prior notice and comment, RFA analysis is not required.

### **Costs of Compliance**

The FAA estimates that this AD affects 617 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this AD:

#### **Estimated costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
Rotation torque check of actuating linkage assembly	2 work-hours x \$85 per hour = \$170	\$0	\$170	\$104,890
Report results of rotational torque check	1 work-hour x \$85 per hour = \$85	\$0	\$85	\$52,445

The FAA estimates the following costs to do any necessary replacement that would be required based on the results of the rotational torque check. The agency has no way of determining the number of aircraft that might need these replacements:

#### **On-condition costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>
Replace compressor IGV outer shroud bushing and vane spindle bushing	2 work-hours x \$85 per hour = \$170	\$25,622	\$25,792

### **Paperwork Reduction Act**

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act

unless that collection of information displays a currently valid OMB Control Number. The OMB Control Number for this information collection is 2120-0056. Public reporting for this collection of information is estimated to be approximately 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. All responses to this collection of information are mandatory. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, Federal Aviation Administration, 10101 Hillwood Parkway, Fort Worth, TX 76177-1524.

#### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

#### **Regulatory Findings**

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866, and
- (2) Will not affect intrastate aviation in Alaska.



## **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

### **The Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

**2022-08-06 General Electric Company:** Amendment 39-22009; Docket No. FAA-2022-0400; Project Identifier AD-2022-00179-E.

#### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

None.

#### **(c) Applicability**

This AD applies to General Electric Company (GE) CF34-8C1, CF34-8C5, CF34-8C5A1, CF34-8C5A2, CF34-8C5A3, CF34-8C5B1, CF34-8E2, CF34-8E2A1, CF34-8E5, CF34-8E5A1, CF34-8E5A2, CF34-8E6, and CF34-8E6A1 model turbofan engines installed on an airplane that has accumulated 250 or more parked days outdoors within the 24 months prior to the effective date of this AD.

#### **(d) Subject**

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compression Section.

#### **(e) Unsafe Condition**

This AD was prompted by an “Engine Degraded” message received in-flight from the Engine Indicating and Crew Alerting System (EICAS), and a subsequent investigation by the manufacturer that revealed corrosion of the variable geometry (VG)

system actuator. The FAA is issuing this AD to detect corrosion of the VG system actuator. The unsafe condition, if not addressed, could result in failure of one or more engines, loss of engine thrust control, and reduced control of the airplane.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Required Actions**

*(1) Torque Check: CF34-8C model turbofan engines with full authority digital engine control (FADEC) software (SW) below Version 6.60, and all affected CF34-8E model turbofan engines*

(i) If the affected engine is installed on an airplane that was parked less than or equal to 10 miles from a saltwater coastline for 250 or more parked days, within 30 flight hours (FHs) or 5 calendar days, whichever occurs first after the effective date of this AD, perform a rotational torque check of the actuating linkage assembly. If an airplane has two affected engines installed while parked less than or equal to 10 miles from a saltwater coastline for 250 or more parked days, operators may perform the rotational torque check of the actuating linkage assembly on the second engine before the second engine exceeds 440 FHs after the effective date of this AD.

(ii) For affected engines not requiring the performance of a rotational torque check by paragraph (g)(1)(i) of this AD, if the affected engine is installed on an airplane that was parked less than or equal to 50 miles from a saltwater coastline for 250 or more parked days, within 200 FHs or 35 calendar days, whichever occurs first after the effective date of this AD, perform a rotational torque check of the actuating linkage assembly. If an airplane has two affected engines installed while parked less than or equal to 50 miles from a saltwater coastline for 250 or more parked days, operators may perform the rotational torque check of the actuating linkage assembly on the second engine before the second engine exceeds 880 FHs after the effective date of this AD.

(iii) For affected engines not requiring the performance of a rotational torque check by paragraphs (g)(1)(i) or (g)(1)(ii) of this AD, before exceeding 880 FHs after the effective date of this AD, perform a rotational torque check of the actuating linkage assembly. If an airplane has two affected engines installed, operators may perform the

rotational torque check of the actuating linkage assembly on the second engine before the second engine exceeds 1,680 FHs after the effective date of this AD.

*(2) Torque Check: CF34-8C model turbofan engines with FADEC SW Version 6.60 or above installed on an airplane that is in service as of the effective date of this AD*

(i) If the affected engine is installed on an airplane that was parked less than or equal to 10 miles from a saltwater coastline for 250 or more parked days, within 200 FHs or 35 calendar days, whichever occurs first after the effective date of this AD, perform a rotational torque check of the actuating linkage assembly. If an airplane has two affected engines installed while parked less than or equal to 10 miles from a saltwater coastline for 250 or more parked days, operators may perform the rotational torque check of the actuating linkage assembly on the second engine before the second engine exceeds 880 FHs after the effective date of this AD.

(ii) For affected engines not requiring the performance of a rotational torque check by paragraph (g)(2)(i) of this AD, if the affected engine is installed on an airplane that was parked less than or equal to 50 miles from a saltwater coastline for 250 or more parked days, before exceeding 440 FHs after the effective date of this AD, perform a rotational torque check of the actuating linkage assembly. If an airplane has two affected engines installed while parked less than or equal to 50 miles from a saltwater coastline for 250 or more parked days, operators may perform the rotational torque check of the actuating linkage assembly on the second engine before the second engine exceeds 880 FHs after the effective date of this AD.

(iii) For affected engines not requiring the performance of a rotational torque check by paragraphs (g)(2)(i) or (g)(2)(ii) of this AD, before exceeding 880 FHs after the effective date of this AD, perform a rotational torque check of the actuating linkage assembly. If an airplane has two affected engines installed, operators may perform the rotational torque check of the actuating linkage assembly on the second engine before the second engine exceeds 1,680 FHs after the effective date of this AD.

*(3) Torque Check: All affected engines that are not currently in service*

If the affected engine is installed on an airplane that was parked outdoors for 250 or more parked days within the 24 months prior to re-entering service, or if the engine

was off-wing and stored outdoors for 250 or more days within the 24 months prior to reentering service, before further flight, perform a rotational torque check of the actuating linkage assembly.

*(4) Replacement of the Compressor Inlet Guide Vane (IGV) Outer Shroud Bushing and Vane Spindle Bushing*

If the actuating linkage assembly does not pass any rotational torque check required by paragraphs (g)(1) through (3) of this AD, before further flight, remove the compressor IGV outer shroud bushing and vane spindle bushing and replace with a zero cycles since new compressor IGV outer shroud bushing and vane spindle bushing.

*(5) Service Information for Performance of the Rotational Torque Check and Replacement of the Compressor IGV Outer Shroud Bushing and Vane Spindle Bushing*

Use the Accomplishment Instructions, paragraph 3.A.(1)(c), of GE CF34-8C Service Bulletin (SB) 72-0356 R00 or GE CF34-8E SB 72-0244 R00, both dated February 15, 2022, as applicable to the engine model, to perform the actions required by paragraphs (g)(1) through (4) of this AD.

**(h) Reporting Requirements**

Within 10 days after performing the rotational torque check required by paragraphs (g)(1) through (3) of this AD, in accordance with paragraph 3.A.(1)(c), of GE CF34-8C SB 72-0356 or GE CF34-8E SB 72-0244, send your inspection report form, pictures, or report findings to GE at [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com).

**(i) Definition**

(1) For the purpose of this AD, a “parked day” is 24 consecutive hours without engine operation.

(2) For the purpose of this AD, “outdoors” is any location that is not environmentally controlled, including any non-environmentally controlled facility.

**(j) Special Flight Permit**

Special flight permits are prohibited.

**(k) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14

CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (l) of this AD and email it to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

**(l) Related Information**

For more information about this AD, contact Scott Stevenson, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7132; email: Scott.M.Stevenson@faa.gov.

**(m) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) GE CF34-8C Service Bulletin (SB) 72-0356 R00, dated February 15, 2022.

(ii) GE CF34-8E SB 72-0244 R00, dated February 15, 2022.

(3) For GE service information identified in this AD, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: aviation.fleetsupport@ge.com; website: <https://www.ge.com>.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov), or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on April 4, 2022.

Lance T. Gant, Director,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

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